

# 22558

**22223**

**3 Hours / 70 Marks**

Seat No. 

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- Instructions* –
- (1) All Questions are *Compulsory*.
  - (2) Illustrate your answers with neat sketches wherever necessary.
  - (3) Figures to the right indicate full marks.
  - (4) Assume suitable data, if necessary.
  - (5) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

- 1. Attempt any FIVE of the following: **10****
- a) List the standard used in design of the piston.
  - b) Define:
    - 1) Tensile stress
    - 2) Resilience
  - c) State and justify material for clutch lining.
  - d) Write the function of valve spring.
  - e) Calculate stroke length and bore length if piston diameter is 120mm and  $L=1.2D$ .
  - f) List the aesthetic considerations in design of chassis component.
  - g) Explain maximum shear stress theory.

P.T.O.

- 2. Attempt any THREE of the following:** **12**
- a) Write the design procedure for basic automobile component.
  - b) An axle 1 metre long is supported in bearings at its ends carries a flywheel weighing 50 KN at the centre. If the bending stress is not to exceed 60 MPa find the diameter of the axle.
  - c) State the function of the rod. Also write material for the rod with justification.
  - d) A semi elliptical leaf spring sustains a load of 80 KN. The overall length of the spring is 1.05m consists of 18 leaves held together by U bolts spaced 100mm apart with overall depth to width ratio of 2. The allowable stress for spring material is 400MPa. Take  $E = 210 \text{ KN/mm}^2$ .
- 3. Attempt any THREE of the following:** **12**
- a) Write design procedure of front axle.
  - b) Explain stepwise design procedure for fully floating rear axle.
  - c) List sequentially stepwise design procedure for rocker arm.
  - d) List reason to adopt ergonomics in component design.
  - e) Define factor of safety. Write the factors to be considered while selecting factor of safety.
- 4. Attempt any TWO of the following:** **12**
- a) Front axle carries a load of 150 KN. Wheel track is 1.4m. Distance between wheel centre and spring centre is 100mm. if stress is not to exceed 100 MPa. find its diameter.
  - b) A multiple disc clutch has five plates having four pairs of active friction surfaces. If the intensity of pressure is not to exceed  $0.127 \text{ N/mm}^2$  find the power transmitted at 500 rpm. The outer and inner radii of friction surfaces are 125mm and 75mm respectively. Assume uniform wear and take coefficient of friction = 0.3.
  - c) List sequentially steps to design connecting rod.

- 5. Attempt any TWO of the following:** **12**
- a) Describe the design of bore diameter, bore length and thickness of cylinder wall.
  - b) Design the diameter of rear axle shaft for fully floating type with following data:-  
Engine power = 50 kw at 3000 r.p.m.  
Gear box ratio = 4.5:1, 2.5:1, 1.6:1, 1:1  
Differential reduction = 5:1  
 $\tau$  for shaft = 75N/mm<sup>2</sup>.
  - c) Describe modes of failure of cylinder block of petrol engine with sketches.
- 6. Attempt any TWO of the following:** **12**
- a) Define stress concentration. What are its causes and remedies to avoid it.
  - b) Explain in detail the design procedure for propeller shaft including universal coupling.
  - c) Describe the design procedure for design of semi elliptical leaf spring.
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